

Seasonal activity of caddisflies (Insecta: Trichoptera) in the Börzsöny Mountains, North Hungary

By

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Abstract. Trichoptera were collected by light trapping in the Börzsöny Mountains in 1996, 1998 and 1999 at Bernecebaráti and Királyréth. Caddisflies were listed into the following flight period types: short, medium or long flight activity, and autumn or summer species. The weekly flight activity patterns of some caddisfly species and their comparison are discussed.

In the temperate zone, the activity of adult Trichoptera is strongly regulated by seasonal conditions, thus, the coldest part of the year is typically unsuitable for flight and reproduction. As a result, the adult caddisflies show specific flight activity patterns. These patterns are different by regions of Europe. The information about the seasonal activity pattern of Trichoptera in Hungary is very limited.

The literature data on the flight of caddisflies in Hungary were divided into two parts. The qualitative data of the flight of a species can be characterized by a time interval (from May to June or from July to October, etc.) or by a definition (summer species or autumn species, etc.). On the other hand, the qualitative data show a frequency distribution among the studied time-intervals. Based on this division, there are many informations on the activity periods (qualitative data) of different species. Unfortunately, the interpretations of some definitions (summer species, autumn species, etc.) are not given in the Hungarian literature.

However, the flight periods (qualitative data) are not sufficient for information on the quantitative aspect of flight activity patterns. There are some data about the flight activity patterns of some caddisfly species from the Mecsek Mountains (Nógrádi, 1987; Nográdi & Uherkovich, 1991) and from the Visegrádi Mountains (Nógrádi *et al.*, 1991). The quantitative data about the flight of caddisflies from the Northern Mountains are very limited. In this study, I intend to give more information about the activity periods and the flight activity pattern of some Hungarian Trichoptera species.

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Material and methods

Sampling sites

The study area can be found in the Börzsöny Mountains in North Hungary. The first study area at Bernecebaráti, at 300 m above sea-level, is found in the northern part of the Börzsöny Mountains, on andesite and andesite-tuff base. The second sampling site is located at Királyrét, at 350 m above sea level, also in the Börzsöny Mountains.

Sampling methods

Caddisflies were caught by light traps. One light trap with a 160 W mercury vapour bulb, 2 m above ground level, was placed near the Bernecei Stream (Bernecebaráti, UTM CU42). This trap was operated from June to the end of October in 1996, and from May to the end of October in 1998.

The second light trap was operated with a 100 W normal bulb, 2 m above ground level at Királyrét (UTM CU40). The trap operated from May to the end of October in 1999. The light trap was placed near the Morgó Stream.

Flight activities

The percentages of the same species were studied at standard weeks (the first day of the year is the first day of the first standard week). The flight activity pattern of the species is given from the 19th to the 44th weeks (Fig. 1). The swarming of the species were calculated with the following formula: Swarming begins on a given standard week, when the number of specimens reaches 2.5% of the total catch. The swarming ends on the week, when the number of the specimens collected is 97.5% of the total catch. This calculation shows time interval of the flight of caddisflies (95% of the total catch). This number may be more informative about the flight, because the trimming of the earliest and latest catches works as noise elimination.

The length of the flight at studied caddisfly species is determined as follows. The lengths of the flight activities were listed into 3 artificial groups: long if the length of the flight activity is longer than 14 weeks. Medium long is the activity if the length of the flight activity is between 8 and 14 weeks, and short if the interval is smaller than 8 weeks.

The spring, summer or autumn species are defined on the occurrence of the highest percentage of the individuals collected in those periods.

Fig. 1/1. *Agapetus deficiatus*

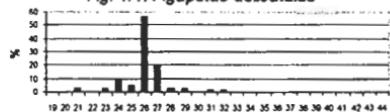


Fig. 1/2. *Anabolia furcata*

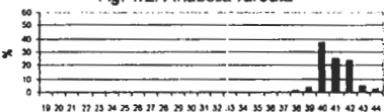


Fig. 1/3. *Atripsodes bilineatus*

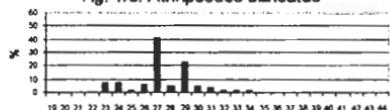


Fig. 1/4. *Chaetopteryx fuscata*

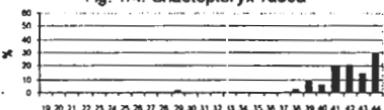


Fig. 1/5. *Eccisopteryx madida*

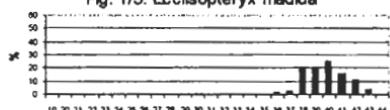


Fig. 1/7. *Halesus digitatus*

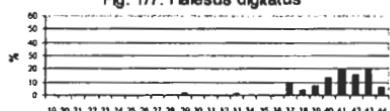


Fig. 1/9. *Hydropsyche instabilis*

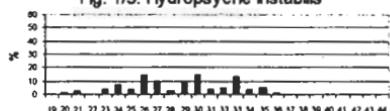


Fig. 1/11. *Micropterna nycterobia*

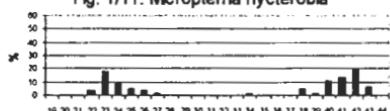


Fig. 1/13. *Polycentropus flavomaculatus*

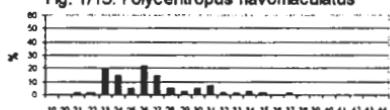


Fig. 1/15. *Rhyacophila fasciata*

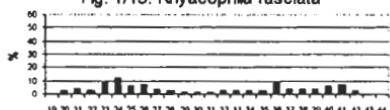


Fig. 1/12. *Micropterna testacea*

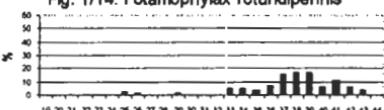


Fig. 1/16. *Silo pallipes*

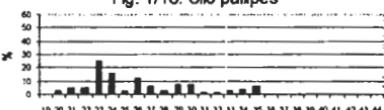


Fig. 1. The weekly flight activity pattern of some caddisfly species in the Börzsöny Mountains

Table 1. Number of individuals, and characteristics of swarming of sixteen caddisfly species observed in the Börzsöny Mountains

Species	Number of individuals	Swarming (in standard weeks)			
		Start	Medium	Stop	Length
<i>Agapetus delicatulus</i> McLachlan, 1884	288	23	26	30	7
<i>Anabolia furcata</i> Brauer, 1857	236	39	41	44	5
<i>Athripsodes bilineatus</i> Linnaeus, 1758	317	23	27	33	10
<i>Chaetopteryx fusca</i> Brauer, 1857	126	38	42	44	6
<i>Ecclisopteryx madida</i> McLachlan, 1867	194	37	40	43	6
<i>Goera pilosa</i> Fabricius, 1775	431	22	27	34	12
<i>Halesus digitatus</i> Schrank, 1781	182	31	41	44	13
<i>Hydropsyche contubernalis</i> McLachlan, 1865	356	24	32	35	11
<i>Hydropsyche instabilis</i> Curtis, 1834	516	21	29	35	14
<i>Hydropsyche saxonica</i> McLachlan, 1884	960	20	24	32	12
<i>Micropterna nycterobia</i> McLachlan, 1875	229	22	*	43	*
<i>Micropterna testacea</i> Gmelin, 1798	438	39	40	43	4
<i>Polycentropus flavomaculatus</i> Pictet, 1834	165	23	26	34	9
<i>Potamophylax rotundipennis</i> Brauer, 1857	357	25	37	43	18
<i>Rhyacophila fasciata</i> Hagen, 1859	734	21	28	42	21
<i>Silo pallipes</i> Fabricius, 1781	332	21	24	35	14

* Not calculated

Results and discussion

Data of 5861 individuals belonging to 16 species were studied. The list of species is given in Table 1. The flight activity patterns of species are shown in Fig. 1. This study gives the first quantitative information about the flight activity patterns of *Agapetus delicatulus*, *Anabolia furcata*, *Chaetopteryx fusca*, *Ecclisopteryx madida*, *Goera pilosa*, *Hydropsyche instabilis*, *Micropterna testacea*, *Polycentropus flavomaculatus* and *Silo pallipes* in Hungary.

Agapetus delicatulus (Fig. 1/1). The only data about the flight activity pattern in Hungary come from Nógrádi *et al.* (1996). They give the following flight period: from June to July. My results are identical with their data. It is a summer species with short flight period.

Anabolia furcata (Fig. 1/2). Kiss (1978, 1984), Nógrádi *et al.* (1996) and Kiss *et al.* (1999) give some informations on the flight period of the species. It is an autumn species with a short flight period.

Athripsodes bilineatus (Fig. 1/3). There are no data about the flight of this species in the literature. This is a summer species with a flight period of medium length.

Chaetopteryx fusca (Fig. 1/4). There are several informations about the flight of this species (Kiss, 1979, 1987, 1989; Nógrádi *et al.*, 1996; Kiss *et al.*, 1999). It is a typical autumn species with a short flight period.

Ecclisopteryx madida (Fig. 1/5). We have good records on the flight period of this species (Kiss, 1979, 1983, 1984, 1987; Nógrádi *et al.*, 1996). It is an autumn caddisfly with a short flight period.

Goera pilosa (Fig. 1/6). There are some data about the flight period (Kiss, 1978; Nógrádi, 1985; Nógrádi *et al.*, 1996). It is a summer species with a flight period of medium length.

Halesus digitatus (Fig. 1/7). An autumn species (Kiss, 1978, 1983, 1984, 1987; Kiss *et al.*, 1999; Nógrádi *et al.*, 1996) with a short flight period. There are also quantitative data about it (Kiss, 1989; Nógrádi *et al.*, 1991). My results correspond to these data. The quantitative data show that the flight begins in summer, but the flight activity is larger in autumn.

Hydropsyche contubernalis (Fig. 1/8). Qualitative data are given about the flight of this species by Nógrádi and Uherkovich (1991) and Nógrádi *et al.* (1991), Uherkovich and Nógrádi (1990). The quantitative data show a flight activity pattern with one peak. Schmidt and Robert (1995) show two peaks in the flight activity pattern of *H. contubernalis* in Germany. In Hungary there is only one peak: this species has one generation here. Andrikovics and Ujhelyi (1983), Nógrádi *et al.* (1996), Nógrádi (1985), Kiss *et al.* (1999) give also good informations about the flight activity of this species.

Hydropsyche instabilis (Fig. 1/9). There are several records about the flight activity pattern. Kiss (1983) lists this species in the spring aspect and also in the summer aspect (1984, 1987). The flight period continues from summer to autumn (Kiss, 1979; Kiss *et al.*, 1999; Nógrádi *et al.*, 1996). In the Börzsöny Mountains, it is a summer species with a flight period of a medium length.

Hydropsyche saxonica (Fig. 1/10). In the Bakony (Nógrádi & Uherkovich, 1985), Mecsek Mountains (Nógrádi, 1987) and at Zselic Downs (Nógrádi & Uherkovich 1990) it is a typical summer species. There are also some data about the flight period in the works of Uherkovich and Nógrádi (1991), Kiss (1979), and Nógrádi *et al.* (1996). The species has a flight period of medium length.

Micropterna nycterobia (Fig. 1/11). The flight activity pattern of this species is very interesting. Kiss describes an autumn flight period for this species (Kiss, 1983, 1984). Other literature data indicate a long flight period from summer to autumn (Nógrádi *et al.*, 1996; Kiss, 1979). Nógrádi *et al.* (1991) and Kiss *et al.* (1999) give an activity with summer interruption (Malicky, 1987). In the Börzsöny Mountains there are two flight activity periods with a summer interruption. The first flight starts in spring and stops in early summer, the second flight starts and stops in autumn.

Micropterna testacea (Fig. 1/12). Kiss (1979, 1984, 1987), Nográdi *et al.* (1996) give information about the flight period of this species. It is an autumn caddisfly species with a short flight period.

Polycentropus flavomaculatus (Fig. 1/13). There are some records about the flight activity of this species (Kiss, 1979, 1983; Nográdi *et al.*, 1996). It is a summer species with a short flight period.

Potamophylax rotundipennis (Fig. 1/14). There are many quantitative (Nográdi & Uherkovich, 1985; Nográdi, 1987) and qualitative (Uherkovich & Nográdi, 1991; Kiss, 1979; Nográdi *et al.*, 1996; Kiss *et al.*, 1999) data about the flight activity. It is a autumn species with a long flight period in the Börzsöny Mountains.

Rhyacophila fasciata (Fig. 1/15). There are numerous qualitative (Nográdi & Uherkovich, 1985; Nográdi, 1987; Nográdi & Uherkovich, 1991) and quantitative (Kiss, 1978, 1983, 1984, 1987; Nográdi *et al.*, 1996; Kiss *et al.*, 1999) data about the flight of this species. In the Börzsöny Mountains it shows a continuous, long activity period.

Silo pallipes (Fig. 1/16). There are many data on the flight period of this caddisfly species (Kiss, 1979, 1983, 1984, 1987; Nográdi *et al.*, 1996; Kiss *et al.*, 1999). In the Börzsöny Mountains it is a summer species with a flight period of medium length.

In conclusion, there are 9 caddisfly species with summer activities and 6 species with autumn activity on the one hand, there are 5 caddisfly species with short, 8 with medium and 2 with long swarming periods on the other hand (*Micropterna nycterobia* was not listed). This flight activity pattern represented catches of Trichoptera collected by light trapping in the Börzsöny Mountains at two permanent streams. This picture can be different at a temporary stream near these sampling sites (Sommerhauser *et al.*, 1997).

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